AIR FORCE

QUALIFICATION TRAINING PACKAGE

(AFQTP)

for

STRUCTURAL

(3E3X1)

MODULE 33

SHIELDED METAL ARC WELDING

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MODULE 33

SHIELDED METAL ARC WELDING

Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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AIR FORCE QUALIFICATION TRAINING PACKAGES
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INTRODUCTION

Before starting this AFQTP, refer to and read the "Trainee/Trainer Guide" located on the AFCESA Web site **http://www.afcesa.af.mil/**

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. ***It is important for the trainer and trainee to understand*** that an AFQTP ***does not*** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:
AFQTP completion
Hands-on certification

Diamond task:
AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCESA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Structures Career Field Manager at the address below.

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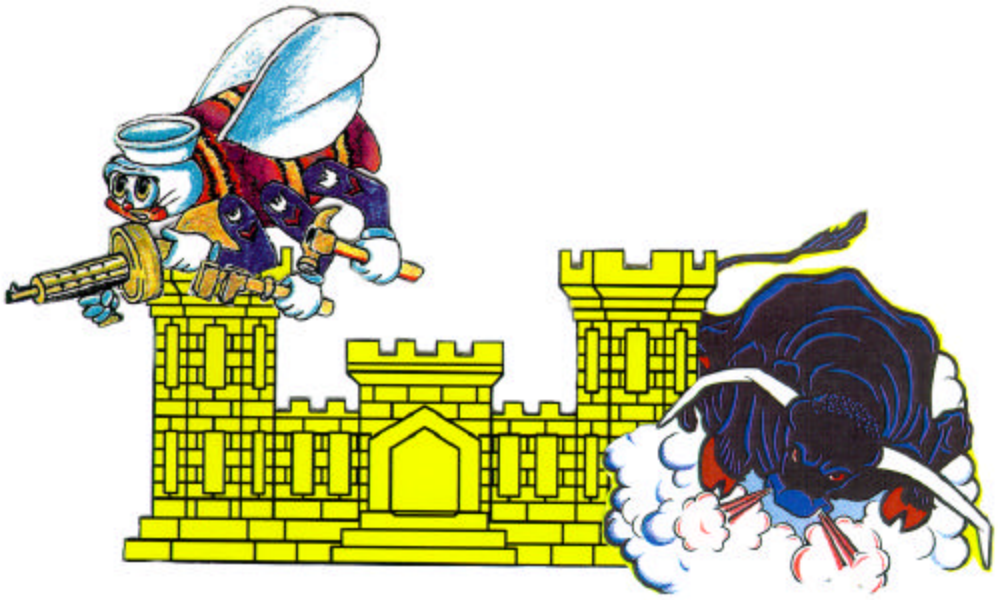


SHIELDED METAL ARC WELDING

MODULE 33 AFQTP UNIT 4

SET UP WELDING MACHINE FOR A SPECIFIC WELDING JOB (33.4.)

SET UP WELDING MACHINE FOR A SPECIFIC WELDING JOB

Task Training Guide

STS Reference Number/Title:	33.4. Set up welding machine for a specific welding job
Training References:	• AFQTP Video PIN # 613764 Shielded Metal ARC Welding • 3E351 CDCs • WELDING SKILLS by R.T. Miller • MODERN METALWORKING by John R. Walker
Prerequisites:	• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	• Gloves, Welding Jacket, Welding Hood • Welding Machine
Learning Objective:	• Individual should be able to set up a welding machine correctly for a specific job.
Samples of Behavior:	• Trainee should be able to set up machine with little or no supervision for a specific job.
Notes:	
• Any safety violation will result in a test failure.	

SET UP WELDING MACHINE FOR A SPECIFIC WELDING JOB

Background: When you set up a welding machine there are 5 factors that must be considered: Type of work, Type of machine, Type of electrode, current and safety factors. All of them are closely related and each one depends on the other. There are two types of welding machines: Direct current (DC), and Alternating current (AC). DC has some advantages over the AC machine; DC is better for welding sheet metal and has a wider selection of electrodes to choose from versus AC machines.

SAFETY:
THERE ARE MANY SAFETY HAZARDS WHEN DEALING WITH ARC WELDING, FROM ELECTRICAL SHOCK TO AVOIDING TOXIC FUMES. MAKE SURE THAT ALL SAFETY PRECAUTIONS ARE FOLLOWED WHEN YOU ARE WELDING.

***To Perform This Task, complete*: Video, PIN # 613764, Shielded Metal ARC Welding**

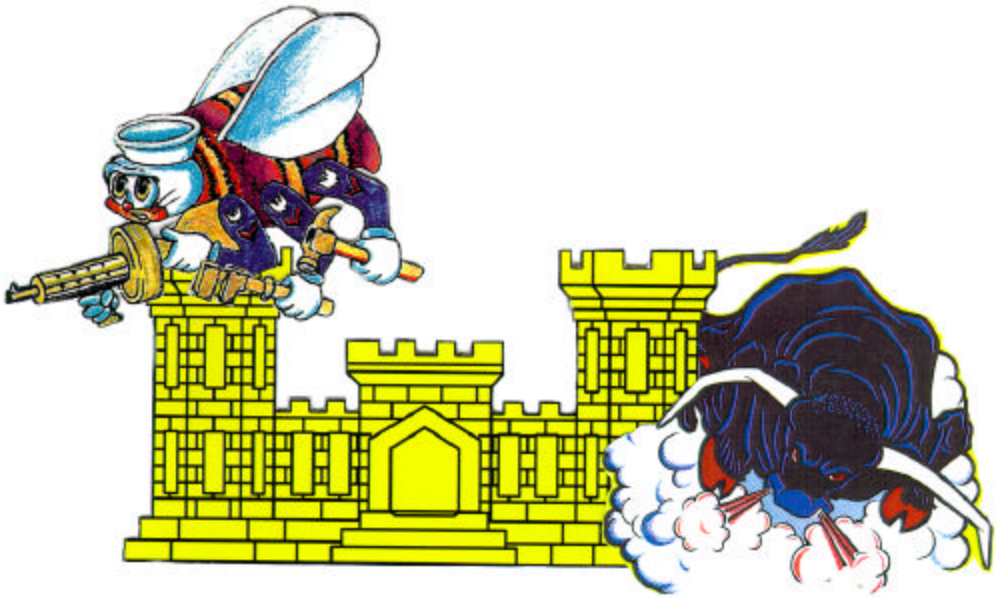
Review Questions
for
Set up Welding Machine for a Specific Welding Job

Question	Answer
1. AC and DC are the two types of welding machines mostly used most often.	a. True. b. False.
2. Electrical shock and Toxic fumes are two of the hazards you deal with when your arc welding.	a. True b. False
3. How should you adjust the current before you start welding?	a. Adjust the current then start your work. b. Adjust your current then weld some trial beads and adjust your current. c. Start welding then turn the current up or down while you welding. d. Adjust your welding speed according to the machines adjustment

SET UP WELDING MACHINE FOR A SPECIFIC WELDING JOB

Performance Checklist		
Step	**Yes**	**No**
1. Did trainee have on the correct safety equipment?		
2. Did trainee adjust the current to the recommended range?		
3. Did trainee clean the metal before he/she started to work?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



SHIELDED METAL ARC WELDING

MODULE 33 **AFQTP UNIT 5**

PREPARE JOINTS FOR WELDING (33.5.)

PREPARE JOINTS FOR WELDING

Task Training Guide

STS Reference Number/Title:	33.5. Prepare joints for welding
Training References:	• AFQTP Video PIN # 613764 Shielded Metal ARC Welding • 3E351 CDCs • WELDING SKILLS by R.T. Miller • MODERN METALWORKING by John R. Walker
Prerequisites:	• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	• Gloves, Hearing protection, Eye Protection, Grinder, Wire Brush
Learning Objective:	• Individual should be able to prepare all types of joints for welding.
Samples of Behavior:	• Trainee will be able to successfully and safely prepare a joint for welding.
Notes:	
• Any safety violation will result in a test failure.	

PREPARE JOINTS FOR WELDING

Background: The preparation of a joint is one of the most important processes in welding. The preparation depends on the thickness of the metal and the type of joint to be used.

SAFETY:
WHEN PREPARING THESE JOINTS BE SURE THAT ALL SAFETY EQUIPMENT IS WORN.

***To Perform This Task complete*: Video, PIN # 613764, Shielded Metal ARC Welding**

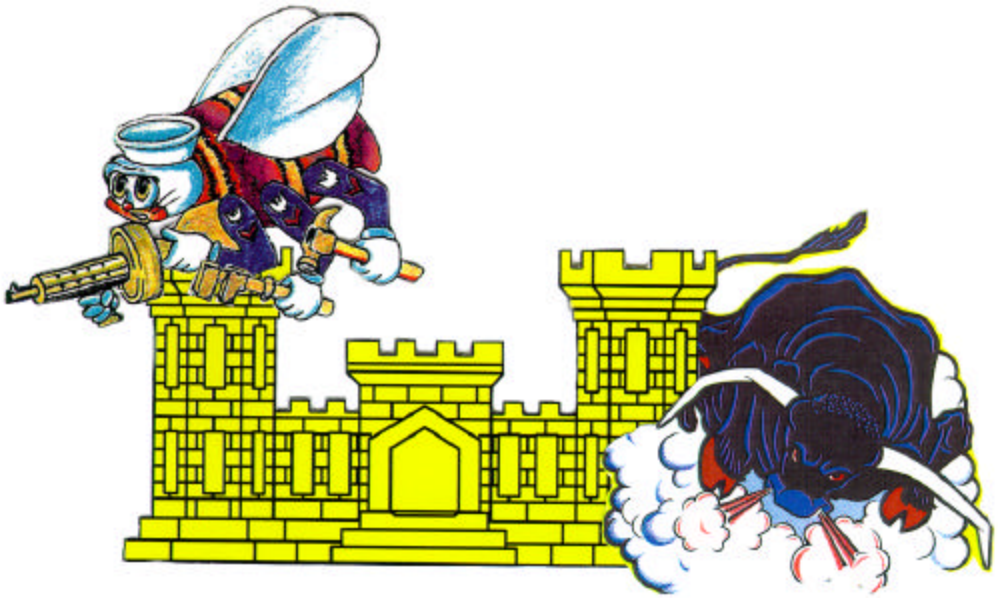
Review Questions
for
Prepare Joints for Welding

Question	Answer
1. The four types of joints are the butt, lap, edge and tee joint.	a. True b. False
2. What is a correct angle for one edge of a single "V" grooved butt joint?	a. 20 b. 30 c. 50
3. You can clean a joint with sandpaper before welding.	a. True b. False

PREPARE JOINTS FOR WELDING

Performance Checklist		
Step	**Yes**	**No**
1. Was all safety equipment worn during the task performance?		
2. Was the correct angle ground on the single "V" grooved butt joint?		
3. Was the correct root opening given for each joint?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



BUTT JOINT POSITIONS

MODULE 33 **AFQTP UNIT 6**

FLAT (33.6.1.1.)

FLAT

Task Training Guide

STS Reference Number/Title:	33.6.1.1. Flat
Training References:	• AFQTP Video PIN # 613764 Shielded Metal ARC Welding • 3E351 CDCs • WELDING SKILLS by R.T. Miller • MODERN METALWORKING by John R. Walker
Prerequisites:	• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	• Gloves, Hearing Protection, Eye Protection, Grinder, Wire Brush, Leather Jacket, Chipping Hammer, Welding Hood
Learning Objective:	• Individual should be able to weld in the flat position.
Samples of Behavior:	• Trainee will be able to successfully and safely weld in a flat position.
Notes:	
• Any safety violation will result in a test failure.	

FLAT

Background: There are four positions used in welding: flat, horizontal, vertical, and overhead. The flat position is the most widely used, because the welding can be done faster and easier.

SAFETY:
ALL SAFETY EQUIPMENT MUST BE WORN WHILE WELDING AT ALL TIMES!

***To Perform This Task complete*: Video, PIN # 613764, Shielded Metal ARC Welding**

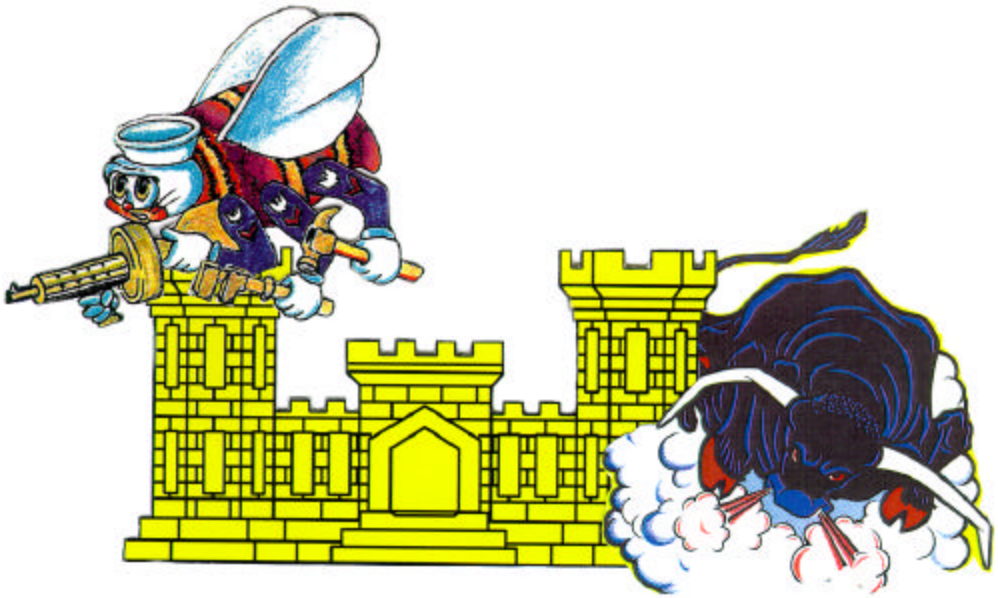
Review Questions
for
Flat

Question	Answer
1. The flat position is the easiest position to weld.	a. True b. False
2. What is the first pass called when arc welding?	a. Root b. Filler c. Cover d. Initial
3. What is the last pass called when arc welding?	a. Filler b. Cover c. Root d. Initial

FLAT

Performance Checklist		
Step	**Yes**	**No**
1. Was all safety equipment worn during the task performance?		
2. Was the correct angle kept through out the weld?		
3. Was the correct electrode selected for the job?		
4. Did trainee clean the metal before the welding began?		
5. Did trainee complete the weld by chipping the slag and cleaning with a wire brush?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



BUTT JOINT POSITIONS

MODULE 33 **AFQTP UNIT 6**

VERTICAL (33.6.1.3.)

VERTICAL

Task Training Guide

STS Reference Number/Title:	33.6.1.3. Vertical
Training References:	• AFQTP Video PIN # 613769 Shielded Metal ARC Welding • 3E351 CDCs • WELDING SKILLS by R.T. Miller • MODERN METALWORKING by John R. Walker
Prerequisites:	• Possess as a minimum, a 3E331 AFSC
Equipment/Tools Required:	• Gloves, Hearing Protection, Eye Protection, Grinder, Wire Brush • Leather Jacket, Chipping Hammer, Welding Hood
Learning Objective:	• Trainee should be able to weld vertical joints.
Samples of Behavior:	• Trainee will be able to successfully and safely weld a vertical joint.
Notes:	
• Any safety violation will result in a test failure.	

VERTICAL

Background: A vertical weld is a joint or line that is running up and down. One of the problems of vertical welding is that gravity tends to pull down the molten pool. Puddle control can be achieved by using several types of welding beads. There are two basic types of vertical welds: *vertical up* and *vertical down*. *Vertical down* is used for lighter gage metal because penetration is shallow. *Vertical up* is practical on 1/4 inch thick and up metal for maximum penetration.

***To perform this task complete*: Video, PIN # 613764, Shielded Metal ARC Welding**

Review Questions
for
Vertical

Question	Answer
1. One of the problems of vertical welding is gravity tends to pull down on the weld?	a. True b. False
2. Vertical up and Vertical down are the two types of vertical welding.	a. True b. False
3. When performing vertical up welding, you should strike the arc at the _____ of the metal and use a whipping action after the arc is achieved.	a. bottom b. middle c. top d. side

VERTICAL

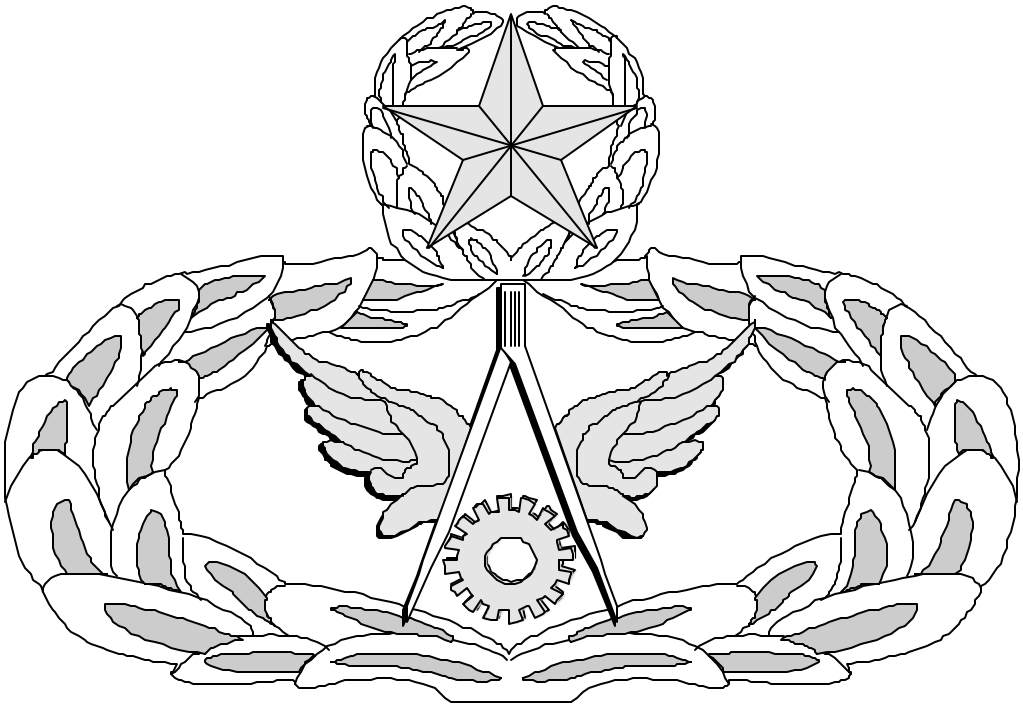
Performance Checklist		
Step	**Yes**	**No**
1. Was all safety equipment worn during the task performance?		
2. Were both vertical welding types used?		
3. Were filler passes used to fill the welding?		
4. Did trainee use the weaving action when welding the cover pass?		

FEEDBACK: Trainer should provide both positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



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MODULE 33

SHIELDED METAL ARC WELDING

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SET UP WELDING MACHINE FOR A SPECIFIC WELDING JOB

(3E3X1-33.4.)

Question	Answer
1. AC and DC are the two types of welding machines used most often.	a. True
2. Electrical shock and Toxic fumes are two of the hazards you deal with when you're arc welding.	a. True
3. How should you adjust the current before you start welding?	b. Adjust your current then weld some trial beads and adjust your current.

PREPARE JOINTS FOR WELDING

(3E3X1-33.5.)

Question	Answer
1. The four types of joints are the butt, lap, edge and tee joint.	a. True
2. What is a correct angle for one edge of a single "V" grooved butt joint?	b. 30
3. You can clean a joint with sandpaper before welding.	a. True

FLAT

(3E3X1-33.6.1.1.)

Question	Answer
1. The flat position is the easiest position to weld.	a. True
2. What is the first pass called when arc welding?	a. Root
3. What is the last pass called when arc welding?	b. Cover

VERTICAL

(3E3X1-33.6.1.3.)

Question	Answer
1. One of the problems of vertical welding is gravity tends to pull down on the weld?	a. True
2. Vertical up and Vertical down are the two types of vertical welding.	a. True
3. When performing vertical up welding, you should strike the arc at the _____ of the metal and use a whipping action after the arc is achieved.	a. bottom